

Incumbent lobbying as a barrier to forward-looking regulation: the case of demand-side response in the GB capacity market for electricity

Article (Accepted Version)

Lockwood, Matthew, Mitchell, Catherine and Hoggett, Richard (2020) Incumbent lobbying as a barrier to forward-looking regulation: the case of demand-side response in the GB capacity market for electricity. *Energy Policy*, 140. a111426. ISSN 0301-4215

This version is available from Sussex Research Online: <http://sro.sussex.ac.uk/id/eprint/90459/>

This document is made available in accordance with publisher policies and may differ from the published version or from the version of record. If you wish to cite this item you are advised to consult the publisher's version. Please see the URL above for details on accessing the published version.

Copyright and reuse:

Sussex Research Online is a digital repository of the research output of the University.

Copyright and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable, the material made available in SRO has been checked for eligibility before being made available.

Copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

Incumbent lobbying as a barrier to forward-looking regulation: The case of demand-side response in the GB Capacity Market for electricity

Matthew Lockwood, Science Policy Research Unit, University of Sussex*

Catherine Mitchell, Energy Policy Group, University of Exeter

Richard Hoggett, Energy Policy Group, University of Exeter

Version accepted for publication in *Energy Policy*, March 2020

1. Introduction

It is widely recognised that the current transformation of energy systems around the world is a process particularly dependent on policy making, relative to previous socio-technical transitions (Unruh 2000, Meadowcroft 2005, Scrase and Smith 2012). At the same time, as research on sustainability transitions engages more deeply with the existing literature on the politics of the policy process, there is an increasingly sophisticated appreciation of the barriers to and complexities of constructing effective policies for such transitions (Kuzemko et al 2016, Kern and Rogge 2018). This article focuses on the challenges of constructing forward-looking policies for sustainable energy transitions in the presence of powerful incumbent interests. It provides an in-depth study of the process by which the rules for demand-side response (DSR) participation in the Capacity Market for electricity in Great Britain were developed. Despite the widespread assumption and statement of the power of incumbents in shaping policy, detailed empirical studies are relatively rare, and this is one of the main contributions of the article.

* Corresponding author, m.lockwood@sussex.ac.uk

DSR is a process by which businesses and consumers can turn up, turn down, or shift demand in real-time,¹ usually in response to a signal or incentive from the system operator or possibly from a network operator.² The significance of DSR for energy transitions lies in the increase in variable renewable generation (e.g. in wind and solar) which is playing a central role in electricity decarbonisation. Variable generation requires greater flexibility for system balancing (Denholm and Hand 2011, Lund et al 2015), but traditional forms of flexibility on the supply side, such as oil- and gas-fired generation, are high carbon and so will become increasingly unavailable. New low-carbon forms of flexibility, of which DSR is one along with others such as pumped hydro and batteries, will become more important.

In Great Britain, flexibility is expected to play a critical role in reducing system costs (Pöyry/Imperial College 2017). However, DSR in Britain has historically been less developed, compared with other systems, such as the US where it already plays a significant role, having been an element in utility integrated resource planning required by regulators for many years (Wilson and Biewald 2013). A forward-looking approach to policy making in Britain would therefore have sought to accelerate this development. Here, we focus on one potential opportunity to do this.

In 2013, as part of a wider set of policies known as the Electricity Market Reform (EMR), Britain adopted a Capacity Market (CM) for electricity in Great Britain. The EMR was intended to lead to accelerated investment in low-carbon electricity generation in the form of new nuclear power and renewables. The concern was that a rise in variable renewables would increase the uncertainty of revenue for conventional dispatchable generation capacity through lower and more volatile wholesale prices, and that this would deter

investment in such capacity, just at a time that flexibility would be increasingly needed to manage more variable net demand.

The CM was intended to address this concern. It takes the form of a periodic auction, conducted by a central buyer, into which all types of resources, including power plants, DSR, storage and interconnectors, can bid. The first auction was held in December 2014. Early clearing prices were lower than had been expected, and the CM was hailed by the government as a success (DECC 2015).

However, the CM was also criticised by a wide range of observers on a number of grounds, one of which was the marginalisation of DSR in the main auctions (Littlecott 2014; Cornwall Energy 2015; Whitehead 2015; ECIU 2016, IPPR 2016). Overall, DSR has to date provided only around 1.5% of contracted resource in these auctions (Table 1). Durwall (2015) described the CM as a 'damp squib' for DSR, and the former Chair of the Energy and Climate Change Select Committee, Tim Yeo, argued that DSR 'has been disadvantaged in the auctions...meaning costs and emissions could be higher than necessary' (quoted in The Guardian 2015). Indeed, the initial rules for DSR in the CM were so controversial that the energy services firm Tempus brought a legal challenge against the granting of State Aid clearance for the CM by the European Commission.³

Table 1
GB Main capacity auctions as of July 2018

Auction date	Type	Delivery	Capacity contracted (GW)	DSR contracted (%)	Expected capacity payments
December 2014	T-4	From 2018/19	49.3	0.35%	£ 956.4m
December 2015	T-4	From 2019/20	46.4	1.3%	£ 834.4m
December 2016	T-4	From 2020/21	52.4	2.69%	£1,179.6m
February 2017	T-1	From 2017/18	54.4	0.39%	£ 372.5m
February 2018	T-4	From 2021/22	50.4	2.39%	£ 423.4m
February 2018	T-1	From 2018/19	5.7	7.47%	£ 34.2m
January 2020	T-3	From 2022/23	45.1	1.19%	£ 290.2m
Total			303.7	1.51%	£4,090.7m

Source: EMR Delivery Body

Note: There are a number of different types of auction. The primary auction is held 3 or 4 years ahead of the delivery year, so is known as a T-3 or T-4 auction. Nearer the time, a year ahead, a T-1 auction can also be held, to 'fine-tune' the amount of capacity contracted.

The CM was developed over a period in which the British electricity system was beginning to change, and by the time of the first auction that change was accelerating rapidly.

Distributed generation was booming, the costs of electrical storage were starting to fall, and expectations about the potential of DSR were also becoming much more serious. In this context, the CM could have offered more of a bridge to the future energy system by prioritising the development of new resources, but in practice it ended up looking like a backward-looking instrument. This outcome stands in stark contrast with the apparent enthusiasm for a major role for DSR in the CM expressed at a senior level early on in the process.⁴ While there have been some improvements in DSR participation rules since 2014,

it is therefore all the more puzzling why DSR was originally brought into the CM on terms that seemed unfavourable.

A widely held view is that the design of the CM was heavily influenced by lobbying from large powerful generation interests. This article tests this view. To guide our analysis we draw on the literature on mechanisms of corporate influence, including the deployment of resources in public-facing strategies of influence, the use of networks with senior policy makers, and the use of ideas in the attempt to get the latter to internalise the commercial interests of corporate actors.

Because the focus here is on a single case study of the politics of policy development, process-tracing (e.g. Beach and Pedersen 2013) was adopted as the appropriate methodological approach. We draw on a range of sources, but two are particularly important: a set of interviews with individuals who had participated in decision making in the CM process, who had been in corporations communicating with decision makers, and who had been close observers of the process (see Appendix 1 for details), and consultation documents published by the government, along with submissions to those consultations.

The remainder of the article is organised as follows. In the next section we lay out the analytical and methodological approach. Section 3 provides context by laying out the origins of the CM and its overall development. The evidence on the process by which the original rules for DSR in the CM were constructed is then laid out in Section 4. In section 5 we assess that evidence in light of the framework outlined in section 2 and draw out some of the implications for governing sustainable energy transitions, with some recommendations for producing a more forward-looking approach in Britain and elsewhere.

2. Analytical and methodological approach

2.1 Analytical approach

A widely held view amongst observers of the energy industry is that the formulation and design of the CM was heavily influenced by lobbying from large powerful generation interests.⁵ For example, the advocacy group E3G stated that:

‘...the current UK Capacity Market proposals...present barriers to the deployment of demand side response, demand reduction, and interconnection solutions to the challenge of securing appropriate resource adequacy in a changing market. The current proposals are suited for incumbents, not innovators.’ (Littlecott 2014: 3)

Similar arguments were put forward by Aldridge (2014) and Baker and Hogan (2014). These specific concerns about the CM are instances of a widely held view that large companies in the British energy sector have considerable influence over policy more broadly (e.g. Bawden 2015).

It is important to note that we see these arguments as hypotheses to be assessed rather than necessarily true. While it is plausible that incumbents will lobby to protect their interests, it does not follow that they will always succeed, or that their interests should be assumed to be static. It is also important to recognise that the CM was part of a wider electricity sector package in the form of the EMR – utilities had already started to invest in renewables, in part because the nature of policy and regulatory design (Stenzel and Frenzel 2008), which in turn began to change the nature of their interests. The carbon price floor element of the EMR would hurt coal-fired generation, but the package offered a quid pro quo in the form of support for new nuclear and a capacity mechanism seen by policy makers at least, as supporting gas-fired generation. The questions examined here are therefore how

incumbents constructed their interests in relation to the CM, whether and how they lobbied in pursuit of those interests, and finally whether there is any evidence that we can attribute the nature of policy decisions to those efforts.

This literature suggests that incumbents such companies will pursue a number of routes to this end. One is that they will tend to have a privileged access to policy makers through a set of ‘relational networks and close contacts’ (Geels 2014: 26) that they can lobby through (see also Wilks 2013). A second is that companies deploy their considerable material resources (e.g. Yackee and Yackee 2006) in more public strategies for influencing via information and more confrontational strategies such as legal challenge (see also Smink et al 2015). A third, more subtle mechanism is the deployment of ideas. Geels (2014: 27) sees this as a process by which ‘market elites’ seek, through a range of formal and informal verbal and written communication, to influence the way that policy makers think, not only about specific policies, but also about ‘basic directions, problem definitions and desired solutions.’ Bell (2012) also places emphasis on the importance of actors’ deployment of ideas, but reminds us that policy makers are not a blank state, and will hold their own ideas, echoing Hall’s (1993) work on policy paradigms.

Thus overall, if corporate influence played a part in preventing a more forward-looking design for the CM that favoured the development of DSR, we would expect to find evidence of incumbents pursuing one or more of these routes. To operationalise the testing of these expectations we need to identify potential ‘incumbents’. We argue that of relevance here are companies with significant assets in electricity generation, and we include two groups in particular. The first is the ‘Big Six’ group of companies which are vertically integrated in electricity generation and supply.⁶ Between them these companies had a 65% market share

in generation of electricity in 2010 (BNEF 2012). Their generation portfolios were dominated by thermal capacity, split fairly evenly between gas- and coal-fired capacity, but with Centrica and EDF especially also having significant nuclear assets arising from the acquisition of British Energy in 2009.

The Big Six are particularly central to this study, since they are the most visible and powerful group. However, there is another group comprising a number of 'second tier' electricity companies with thermal generating assets but no significant supply businesses. This includes members of the Independent Generators Group (International Power, DONG UK, Eggborough Power Ltd, Drax Power Ltd, InterGen, and ConocoPhillips), and ESB International. These companies were also heavily invested in thermal fossil fuel capacity, particularly coal and combined-cycle gas turbines (CCGTs) (DECC 2012a).

Between them, these two groups of companies – i.e. the Big Six and the second tier generators – owned 96% of GB electricity generating capacity in 2012, and 94% of fossil-fuel thermal generation. The interests of these companies were such that DSR would be expected to be a direct competitor for generation in the CM, and would also undermine revenues in the wholesale market. One would thus expect owners of major generation assets to be opposed to a major role for DSR. The Big Six were integrated into supply, which means that they would also lose supply revenue from DSR at peak periods from half-hourly metered customers. A possible counter-argument would be that, because they had relationships with electricity consumers, these companies might have seen the development of DSR services to other company's customers through the CM as a new, alternative revenue stream. However, while some companies (e.g. British Gas/Centrica, E.On UK) did operate energy services businesses, the vast bulk of revenue for the Big Six

came from generation and supply, and their core company capabilities were in these latter areas.

2.2 Methodology, methods and sources

Because the focus here is on a single case study of the politics of policy development, process-tracing is appropriate methodology (Beach and Pedersen 2013, Bennett and Checkel 2015). In establishing causal mechanisms, Beach and Pedersen (2013: 46-47) argue the need to identify specific *entities* at each stage of a chain, along with *activities* that these entities undertake. In this case, the key entities we are interested in are the large corporate generators (hypothesised as incumbents) and senior decision makers (politicians and officials), while the activities include networking, the transfer of ideas and the deployment of corporate strategies for influence in various forms including lobbying, with the aim of influencing policy.

The evidence used in this study is drawn as much as possible from a range of different sources, but two of these are particularly important:

- *Interviews* with individuals who had participated in the process of developing the CM, and those who had been close observers of the process (see Appendix 1 for details). There is some sensitivity about the topic of corporate influence, with both corporate and government interviewees having an incentive to deny or play down the possibility that it occurred. We attempted to address this problem by using interview schedules that did not ask direct questions about lobbying. Interviewees with independent observers are an important source of triangulation here, but whereas their evidence may not be biased, it may also be less accurate. It should

also be borne in mind that the events being studied occurred in the period from the late 2000s up to 2014, whereas the interviews were undertaken during 2016-18. The memories of interviewees, especially about timing and sequencing of events, may not always be accurate, so documentary forms of evidence are also important.

- *Consultation documents and submissions.* There were a number of points in the evolution of the CM where the government published consultation documents and the accompanying submissions. In particular we draw on submissions to the December 2010 EMR consultation (DECC 2010) and the July 2011 consultation on the Capacity Market (DECC 2011a).⁷ We also draw on submissions and oral evidence to two inquiries on the EMR conducted by the House of Commons Energy and Climate Change Committee (ECCC 2011, 2012).

In addition, the paper also draws on a range of other sources including: information on meetings between corporate actors and Ministers; speeches and statements by politicians and corporate CEOs, and media reports.

Finally, it should be noted that there are some particular problems relating to evidence in the study of corporate influence through lobbying. Much of this type of activity happens behind closed doors. Publicly available documents rarely contain sensitive information which may nevertheless be shared between actors, and which may often highlight specific commercial interests and explain the approach of individual actors.

3. The origins of the Capacity Market

In the late 2000s, UK government commitments to decarbonise and to promote renewable electricity became more serious, with the adoption of the 2008 Climate Change Act and

agreement on the 2009 EU Renewables Directive, which led to the adoption of new 2020 targets. At the same time, the governing Labour Party had reversed its earlier stance on nuclear and was keen to see new plants built (Mitchell 2008: 105-115). Responding to government signalling, by the end of the 2000s all the Big Six companies were involved in one of a number of competing nuclear new build consortia.⁸ However, new nuclear power could not be supported by the Renewables Obligation, and an overt subsidy for nuclear would be ruled out under State Aid rules. This meant that both government and industry had an interest in a support mechanism that could be framed as being for 'low carbon' generation.

Over the period from 2009 to 2013, a set of policies known as the Electricity Market Reform (EMR) were developed.⁹ The EMR involved four new elements: a new form of support for 'low carbon' electricity (renewables but also new nuclear power); a plant-level Emissions Performance Standard for greenhouse gas emissions; a Carbon Price Support for allowances in the EU Emissions Trading Scheme, and a Capacity Market.

The classic argument for a capacity mechanism is based on a 'missing money' problem in energy-only markets (Joskow 2008). However, much of the debate in the case of the GB Capacity Market was about 'missing markets' (Newbery and Grubb 2015: 66), i.e. a collapse in investment in conventional generation capacity arising from uncertainty created by high levels of variable renewables leading to reduced and more volatile wholesale prices (Cramton et al 2013). As both renewables and new nuclear had frameworks of support in the EMR, the argument was that conventional thermal capacity, especially CCGT plants, needed for back-up, would also need a support policy.

It is important to note that at the time of the debate about whether to adopt a capacity mechanism in Britain, there was no clear academic consensus (IEA 2016: 97). Many jurisdictions, such as Australia's NEM, had energy-only markets. Other countries going through debates about whether or not to adopt a capacity mechanism, such as Germany, did eventually not do so, partly because the case for impending scarcity was even weaker than in Britain, but also because of concerns about lobbying and excessive cost (Lehmann et al 2015). Where there were capacity mechanisms these varied widely in design, with some with some jurisdictions having capacity payments, some using reliability standards and others using capacity markets (Spees et al 2013, Battle and Rodilla 2010). However, there were also clear examples of capacity markets in the US, particularly the PJM and ISO-New England, with successful experiences of a significant and increasing role for DSR (Hurley et al 2013, Gottstein and Schwartz 2010).

In the late 2000s, an important forum for informal high level dialogue between the Department for Energy and Climate Change and the Big Six about the EMR was a body called the UK Business Council for Sustainable Energy (UKBCSE).¹⁰ Originally founded in 2001 at the time of the World Summit on Sustainable Development, the UKBCSE evolved into a forum for chief executives from the Big Six and National Grid to meet both amongst themselves and with senior figures in government. By the mid-2000s it had become the most important energy industry forum, facilitating high-level contact between the Big Six and DECC, including regular informal dinners with the Secretary of State and Permanent Secretary, as well as meetings with lower-level officials.¹¹ It also provided an important coordinating arena for companies to discuss and collate their positions on the EMR, with a working group and an EMR strategy day for senior staff in the autumn of 2010.¹²

A majority (but not all)¹³ of the Big Six and the second-tier generators were in favour of a capacity mechanism. These companies were to an extent pushing on an open door, since following the 2010 general election, the incoming Coalition government was keen to be seen to be taking action on energy, and by 2011 was also becoming increasingly concerned about what it saw as a medium-term capacity problem. The intention to legislate for a mechanism was confirmed in the July 2011 White Paper, *Planning our Electric Future* (DECC 2011a).

Once the decision to have a capacity mechanism of some sort was made, attention turned to whether this would be a targeted mechanism in the form of a Strategic Reserve (SR), in which capacity would be withheld from the wholesale market, or a market-wide mechanism in which all or most generators could participate while remaining in the market. The government's initial preference was for a SR mechanism, on cost grounds. However, by the end of 2011 the government announced that it would choose a market-wide approach (DECC 2011b: 22). This was in part due to heavy lobbying by the major generators using a 'slippery slope' argument against SR, i.e. a SR would reduce the rewards available in the wholesale market, leading potential investors in new plant to hold back, which would increase the amount of capacity required to be tendered for in the SR, eventually leading to all capacity ending up in the SR (Lockwood 2017). But according to sources from within government the decision was also taken because of increasing concerns about the volume of future capacity that would be required in the future, with that concern symbolised by the idea of an extended winter anti-cyclone with low wind generation and high demand.¹⁴

It was only after these broad dimensions of the CM had been decided that attention moved to the terms of which DSR would be able to participate. It is to this process that we now turn.

4. Development of the DSR rules in the CM

4.1 The early debate

Early on in the process senior politicians were enthusiastic about DSR in the CM. Giving evidence to the House of Commons Energy and Climate Change Committee in the spring of 2011, the then Secretary of State, Chris Huhne, said:

‘Absolutely crucially, we envisage [the capacity mechanism] supporting the negawatts concept, that is, supporting an ability to pay companies that might go into a particular area and say “We will pay all of the consumers in this area a certain amount or install a gadget that will turn off the fridge and the freezer for those few minutes over the Coronation Street advertising break. It won’t affect their ability to keep their frozen peas frozen, but it will save us the need for a peaking plant.”’.

(ECCC 2011: 116)

Similar statements were made by the Energy Minister, and by the Director General for Energy Markets and Infrastructure at DECC, Simon Virley, who described DSR as ‘the real prize’ (ECCC 2011: Ev 117).

There is some evidence that this interest at senior levels was partly influenced by lobbying by civil society organisations including E3G, Friends of the Earth,¹⁵ Green Alliance¹⁶ and

WWF (2013) and by technical expert groups such as the Regulatory Assistance Project (RAP) (Gottstein and Schwartz 2010, Gottstein and Skillings 2012):

‘Greg Barker [then Minister for Climate Change] was keen on this, prompted by E3G, ECF – they were pushing.’¹⁷

‘[RAP] had influence early on...was doing a lot of work for DECC for free...argued the whole necessity of a CM originated from a CfD...this is how you get DSR in...you need a CM in order to get revenue streams for DSR.’¹⁸

Consistent with early support, the 2010 EMR Consultation document and the 2011 White Paper both distinguished DSR as a separate resource from generation (DECC 2010: 82-91; DECC 2011a; 63, 77).

In their submissions to the 2010 and 2011 consultations, many corporate actors appeared to argue for equivalent treatment for generation and DSR (e.g. E.ON 2010, 2011, SSE 2010, International Power 2010, Drax 2010, 2011, InterGen 2010, ESB 2011), and some were supportive of DSR in principle.¹⁹ Support was also expressed by senior representatives of the Big Six to the Energy and Climate Change Committee. For example, Sarwjit Sambhi, Managing Director of Power Generation for Centrica, told the Committee that:

‘Our assumption, and I think DECC’s assumption, is that demand side response will participate in the capacity market...I think it is a great opportunity to have innovation in the electricity market.’ (ECCC 2012: Ev 21).

However, despite these kinds of statements, several participants in or close observers of the process saw political and industry commitment to DSR as merely rhetorical:

‘...the fundamental driver was always new build. What [politicians] wanted was system adequacy in the long term...they pretended they wanted DSR because of lobbying.’²⁰

‘...the capacity market was all about capacity from the outset.’²¹

‘The original genesis of the Capacity Market had nothing to do with DSR. DSR came in...under pressure from E3G and others...’²²

Consonant with this interpretation, corporate actors also fired warning shots about what they saw as the inferior nature of DSR as compared with conventional generation. One criticism was that DSR would only be of use in solving resource adequacy problems over short time periods (e.g. Scottish Power 2010, 2011, International Power 2010, ESB International 2011). Another set of arguments was about reliability and difficulties of establishing baselines (EDF 2011, Scottish Power 2010, International Power 2011). E.ON (2010: 17) argued that DSR and storage should be eligible in a capacity mechanism, but that there was a need to ‘demonstrate that they can genuinely provide value and that the contracted capacity can be delivered when required.’

The issue of reliability of delivery did emerge as a concern within DECC, according to an official playing a senior role in the EMR overall.²³ Certainly, policy makers in the UK lacked experience of DSR, relative to those in the US. Despite visits to US markets and documentary evidence showing good overall performance of DSR delivery as well as a significant role in helping systems cope with shocks in 2013 and 2014 (e.g. PJM 2013, 2014, Hurley et al 2013), uncertainty about the approach within the context of a desire to reduce uncertainty may have worked against it.²⁴ However, according to the same source, reliability of delivery issues did not in the end play a large role in decisions.

4.2 Influencing perceptions of a capacity crunch

Over the period from early 2011 onwards, the government began to come under increasing pressure from the large generators, and especially the Big Six, to get a capacity mechanism in place urgently. The capacity margin in the early 2010s was actually high by recent historical standards, but was forecast to fall rapidly once coal-fired and nuclear plants closed from 2015 onwards (DECC 2011a: 65). However, it was also the case that over the period that the Capacity Market was being developed the economics of gas-fired power generation were difficult relative to coal, and over the early 2010s a number of plants were mothballed or closed. Paradoxically, these actions reflected a glut of capacity, but some companies used these closures to signal the possibility of a future capacity crunch and the urgency of signals for new investment. For example, at the end of June 2011, just ahead of the publication of the EMR White Paper, the CEO of Centrica Sam Laidlaw gave a speech (widely covered in the media) in which he claimed that:

‘The clock is ticking. In my view, we as a nation have got one year in which to take action, or our carbon reduction targets may have to be sacrificed in the interests of safeguarding the security of our energy supplies.’²⁵

There were similar messages from EDF, Intergen, International Power, E.On and RWE through 2012. 2013 started with a statement in January from Scottish Power’s Chief Corporate Officer, Keith Anderson, arguing that:

‘...it is crucial to ensure that progress is made on the Government’s current delivery timetable with...a capacity mechanism being introduced in 2014. Ofgem’s evidence

on security of supply and accelerated closure of coal-fired power stations means that there is a need to progress with a first capacity auction in 2014.²⁶

SSE made similar statements in March 2013²⁷ and Centrica again in April (Gosden 2013).

While the basis for this pressure was challenged (described as ‘scaremongering’ by Pollitt, quoted in Tsagas 2014) the steady stream of warnings put enormous pressure on the government to deliver the CM quickly.

4.3 The development of detailed rules

The DSR industry had also responded to the 2010 and 2011 consultations. Some companies gave guidance on aspects of CM design that they thought would be supportive of the development of DSR. Kiwi Power (2010) stressed the importance of advance (i.e. day ahead) notification for deployment of DSR within the contract period, and argued that the expected low frequencies of utilisations would work better for DSR, with some ability to opt out of certain windows, with an event duration of around 2-4 hours being realistic (Kiwi Power 2011). They also raised concerns that excessively high penalties for non-delivery would make participation too risky for DSR, and that a qualification process that requires DSR providers to have committed customers’ contracts several years ahead of programme start would exclude too many potential providers. They were also concerned that in other capacity markets, run-up and run-down rates had been designed around generators, and did not fit DSR providers well. EnerNOC (2011) emphasised the need for a stable, durable mechanism, as an on-and-off mechanism would deter companies offering DSR. They also noted that potential DSR participants would want clarity on expected frequency of dispatch, length of expected dispatch and temporal distribution (e.g. more than once a week).

However, when it was published in 2012 none of these ideas appeared in the draft Energy Bill. The Bill was roundly criticised by the Energy and Climate Change Committee as: ‘...fundamentally flawed by the lack of consideration given to demand-side measures.’ (ECCC 2012: 16). It was not until the publication of an EMR Policy Overview document at the end of 2012 that more detailed proposals for the treatment of DSR started to emerge. This document first introduced the idea of ‘transitional arrangements to support the development of DSR and storage to better enable their participation in the Capacity Market’ (DECC 2012b: 20), including special auctions for DSR and storage in 2014 for delivery in 2015-2017 aimed at building the capacity of the DSR and storage industries.

In early 2013, DECC set up a CM Expert Group²⁸ which worked over the winter and early spring of 2013. The role of the Group was to provide expert input and feedback, and it covered a large amount of ground in the detailed design of the CM, including the treatment of DSR. It was thus potentially influential, especially in the deployment of ideas about the nature of both the resource adequacy problem and detailed design of solutions. However, the Group included only one representative from a DSR firm, and none from the organisations that had championed the role of DSR in a capacity mechanism early in the process. The US economist Steven Stoft was also on the Group as a consultant, but overall the large incumbent generators dominated, with seven out of the thirteen members of the Group being from the Big Six and the IGG.²⁹ The Expert Group discussed DSR in March 2013, reviewing DECC’s proposals.

In April 2013, DECC then proposed the creation of a ‘Collaborative Development’ (CD) process,³⁰ described as ‘a phase of EMR in which industry works closely with DECC and delivery partners on developing the detailed design of EMR systems and processes for

implementation’.³¹ The process was overseen by an Implementation Steering Group,³² which in addition to members from DECC and Ofgem, had 16 industry members, of which nine came from Big Six and second-tier generators. Other members included representatives of DSR firms and industrial energy users (although according to one observer close to the DSR industry, some of these representatives felt in retrospective that they ‘were only there to tick boxes’³³). The CD process involved a set of working groups, including one dedicated to the CM, which held a series of intensive workshops between mid-August 2013 and the end of September 2013 and then follow up meetings in December 2013 and January 2014. These covered the qualification and auction process, the capacity agreement, the governance process, financial aspects, including credit requirements, and DSR.

At this stage, an important factor in the decisions taken appears to have been a lack of willingness and time on the part of officials to engage with the detailed rules from the point of view of what was a more marginal industry than generation.

‘The rush to finish, and a little bit of ‘Project Fear’ perhaps...you need gigawatts, to get them moving now, which turned out not to be true in the end. But that fear, coupled with the desire to get the thing over the line, resulted in neglect of details that are far more significant to demand response than they appear to be to someone who’s not really looking at it...’

‘There was a bit of table-thumping going on...Let’s get it done, let’s get it over the line, let’s get it finished,...tie a ribbon on it...which resulted in an unwillingness to engage in the level of detail that was necessary to make it work.’³⁴

4.4 Contract length and cost recovery

In October 2013 DECC published a consultation document on an EMR Implementation Plan (DECC 2013), which contained detailed proposals for the treatment of DSR. These proposals divided opinion between some of the major generating companies on the one hand and the DSR industry on the other, ‘with some respondents claiming that DSR could not operate in the Capacity Market as currently envisaged...’ (DECC (2014a: 102). The DSR industry was unhappy with many of the proposals, including what they saw as unfair bid bond amounts, a cumbersome pre-qualification process, and unsatisfactory spot test arrangements for assurance, all of which deterred effective participation.

Within this general picture, two areas proved particularly controversial. One related to contract length and auction participation. The implementation plan proposed that DSR could participate in three types of auction:

- The main T-4 auctions, held 4 years ahead of delivery, where the bulk of capacity would be auctioned for. The first of these would be in 2014 for delivery in 2018/19
- T-1 auctions, held a year ahead of delivery, which were for ‘fine tuning’ capacity procurement nearer delivery time. The first of these would be in 2017 for delivery in 2018/19
- Transitional arrangement (TA) auctions for DSR, which were to be held in 2015 and 2016.

However, the proposed rules did not allow a DSR provider who had entered the T-4 auctions in 2014 or 2015 to subsequently enter a TA auction. A paper commissioned by some of the DSR firms in 2014 later argued that this was a serious disincentive to enter the larger T-4 auction, and prevented DSR providers from building up a longer set of contracts through a

number of different auctions, to help grow the DSR sector (NERA 2014). It was seen by those in the DSR industry as a form of discrimination.³⁵

The argument for longer contracts was based on the experience in the industry that while DSR may involve lower capital costs than generator, it still involves a degree of investment and commitment from large energy users, which will not be forthcoming on the prospect of only a single year's revenue.³⁶ This point was also made in 2014 by Jeremy Nicholson of the Energy Intensive User Group in evidence to the Energy and Climate Change Committee:

'I think it is strange, and some of us have struggled to understand why this should be the case, that there is not a demand-side product for more than a year's duration. After all, some businesses will have to make physical investments. They may not recover the costs of those investments in order to provide demand-side service that can be certified and delivered reliably and so on, of the sort we would all want, competing against supply. If those costs cannot be recovered within a year or so, it is going to make the commercial case for their involvement rather problematic.'³⁷

The NERA report (2014) also pointed out that whereas DSR providers could only access one year contracts, new gas plants could access contracts of up to 15 years, while refurbishing generators (most likely to be coal plants) could get three year contracts. However, despite these concerns raised by the DSR industry, the proposals for auction participation and contract lengths for DSR were carried over into the final design announced in 2014.

A second key issue was about the funding of the CM. It was always envisaged that the cost of paying CM providers would ultimately be recovered through suppliers levying charges on electricity consumers. The proposal in the Implementation Plan was that the proportion of the annual amount payable by each supplier would be determined by the supplier's market

share at the time of system peak demand, in particular the forecast average demand of the supplier's customers across the three half-hourly periods of annual peak demand, known as the 'Triad' (DECC 2013: 209). Unlike some other jurisdictions with capacity markets, for example in the US, the GB retail market is fully liberalised. While the ability of suppliers to pass costs through to small consumers in a targeted way was limited by metering technology, it was expected that they would pass the costs of the CM through to half-hourly metered large consumers proportionately to peak demand. This would give an incentive for large consumers to reduce demand at these peak periods, thereby stimulating the DSR market.

The EMR Implementation Plan consultation formally closed on Christmas Eve 2013. However, this was not the end of the story. According to one close observer of the energy industry,³⁸ Energy UK, the successor to the UKBCSE, lobbied the government on cost recovery over Christmas 2013 and by early January 2014 the approach had been changed. The issue was discussed by the CM Expert Group at which DECC tabled a document that noted that:

'Suppliers raised concerns around this peak charging approach in advance of, and in response to, the EMR implementation consultation...Though there is no unanimously supported alternative, there is broad support from large suppliers for basing charges on suppliers' forecast share of demand over the entire year...' (DECC 2014b: 1)

The argument of the suppliers on cost recovery focused on the difficulty of forecasting market share, and predicting Triad periods, although the tabled document notes that:

‘Suppliers have not supplied any quantitative evidence to substantiate these concerns, e.g. to demonstrate the relative volatility of Triad periods and the difficulty of Triad forecasting’ (DECC 2014b: 3).

However, some close to the DSR industry argue that the real interests of suppliers lay in the generation arms of their vertically integrated businesses.³⁹ Placing cost recovery on Triad periods would have provided a strong incentive for Triad avoidance, which would have reduced peak demand and in turn generators’ revenue. It would have also reduced the estimated required capacity for future auctions and so future CM payments. On this view the argument for spreading cost recovery over a wider period was less about predicting demand and more about bringing forward new gas capacity to bulk up generation in the winter.

Arguing that it wanted to keep some link between cost recovery and periods of high demand, DECC proposed that cost recovery be based on the forecast market shares of suppliers for the hours of 4-7 pm on weekdays over the whole of the period November to February inclusive, i.e. around 100 days, which it saw as a ‘reasonable compromise which takes account of the principle [sic] concerns from suppliers relating to the variability of a peak charge approach without losing the demand reduction incentive.’

For the managing director of a DSR firm:

‘The manner in which that decision was taken was very poor. The result that they arrived at was not one of the options on which they consulted...Christmas Eve 2013 was the famous day, and the result of that that came out afterwards was a radical change that was a fait accompli, we couldn’t influence it.’⁴⁰

More widely, there are reports of representatives of the DSR industry in CD meetings being 'aggressively shouted down'⁴¹ by incumbents:

'And also they set up lots of working groups, that were again highly populated by industry people, and you know, you heard stories about how viciously they opposed ...demand response providers and it all got quite vicious because they thought they were actually taking away their generation revenues.'⁴²

The British government gained State Aid approval for the CM from the European Commission in July 2014. However, in December 2014 the DSR company Tempus Energy brought a challenge to the European General Court arguing that State Aid approval was unlawful,⁴³ on the grounds that the CM discriminated against DSR providers, in particular: that DSR participants could obtain only one-year duration contracts, compared with 3-15 year contracts for new and refurbished generating plants; that DSR participants were forced to choose between transitional and enduring auctions; that the final cost recovery mechanism was not proportionate; that capacity events in the main auction were not time-bound; that the bid bond arrangements were discriminatory and that there was a failure to recognise the value of avoided transmission and distribution costs in the CM contracts. In 2018 the General Court ruled in favour of the Tempus Energy challenge, and State Aid approval was annulled,⁴⁴ leading to the UK government suspending payments within the CM. The ruling required the Commission to undertake a new review for State Aid approval, which was given in October 2019.⁴⁵ At the same time, the UK government committed to making a number of changes to the CM design to meet the complaints raised by Tempus (BEIS 2020).

5. Conclusions and policy implications

This article has assessed the argument that the terms on which DSR originally entered the GB Capacity Market for electricity were strongly influenced by lobbying from large companies with existing generation assets. It provides a detailed empirical case relating to the wider argument that incumbents will play a major role in slowing and shaping sustainable energy transformations.

If incumbent influence did indeed play a significant role in the design process for DSR rules in the CM we would expect to find evidence that the major generators had deployed public facing strategies, had been able to draw on close networks of contacts and networks with senior policy makers, and that the latter had internalised the ideas and interests of the former.

The account presented above suggests that there is indeed fairly clear evidence for all three of these criteria. It is clear that some Big Six and second-tier generating companies lobbied at certain points to close down what they framed as special treatment for DSR, for example in bid bond levels and contract length, and to change the proposed triad option for cost pass through. In this lobbying incumbents deployed a set of ideas about DSR, especially that it was inferior to generation capacity in both duration and reliability of delivery. Uncertainty in the minds of policy makers about the performance of DSR, given their very limited experience of it relative to, for example, US markets, may have made them particular receptive to such ideas, especially as they were under considerable political pressure to reduce uncertainty with some urgency. The argument about duration rested in turn on the earlier efforts of some large corporate generators to frame the problem as being about capacity as opposed to flexibility. While some NGOs and sector think tanks had argued that

the CM was an opportunity to accelerate the development of DSR in the UK, there is no evidence that this view had influence in the later detailed design phase, nor that academic input played a major role.

Institutional arrangements also favoured large corporate actors, providing points of contact and the use of existing networks. Up until 2012 the UKBCSE gave the chief executives of the Big Six direct and privileged access to senior politicians and officials in an informal setting. In the later stages of the CM the mechanisms of the Expert Group and the Collaborative Development process were explicitly designed to bring industry and policy makers together, and the construction of these mechanisms tended to give the larger generators strong representation. There were of course other coalitions and actor networks⁴⁶ that attempted to influence the CM rules. In this case, the CM was indeed the subject of much 'intense lobbying'⁴⁷ not only from the large generators but also from NGOs and think tanks making the case for DSR in general, and DSR firms pressing on the details of the rules. However, most DSR aggregators were relatively new at this stage, and all (with the possible exception of the US firm EnerNOC) were relatively small, and could not match the capacity of the large generators to mobilise collection and analysis of information or the commissioning of modelling.⁴⁸ This inequality of resources mattered because, while DSR started off in the CM as a relatively high profile issue, it quickly slid down the political agenda (again in part as a response to fears about a capacity crunch).

Another barrier to the arguments of DSR providers that specific aspects of the rules of the CM did not work for them was a strong desire by officials to fast track the setting up of the CM, and a resulting unwillingness to engage on details given limited time and resources. In turn, this sense of urgency was in part created by a running campaign through 2011 to 2013

by the larger generators which drove a fear of a looming capacity crunch. The rules for DSR were not the primary target of this campaign, but it ended up having a major effect on them.

Attribution in studies such as the present one that adopt a process tracing methodology can never be perfect; the approach is essentially Bayesian in nature (Beach and Pedersen 2013). However, we argue that the strength of the research rests on the use of several different sources of evidence and a detailed study of the policy process. Such studies of energy policy *processes* remain relatively rare, but more are essential for understanding energy transitions and for recommending the types of governance arrangements that are needed to accelerate such transitions.

In terms of specific rules within the CM, there have been a number of changes subsequent to 2014 that have improved the situation, in response to proposals from the DSR industry itself and arising from the Tempus case.⁴⁹ However, given the focus of this study, recommendations here focus on the *process* of policy making within sustainable energy transitions, given the realities of incumbent lobbying.

One possible response is to take steps within government departments and other decision making organisations to foster greater explicit self-awareness about industry lobbying.⁵⁰ However, at least in jurisdictions with market-based energy systems, governments have a structural dependency on the energy industry, with quite strong political incentives to accede to demands to create conditions for investment (e.g. Wilks 2013: 129). This situation implies that there is a need to involve others who do not share those incentives in the decision making process. While major energy policy decisions should ultimately be taken by elected politicians, as they have democratic legitimacy, where incumbents have the type of

influence seen in the GB case, there is also a strong case for the creation of an independent voice⁵¹ – potentially in the form of a standing body – with a strong mandate to steer and inform those decisions in a forward-looking direction, as well as the resources and focus to deliver on that mandate. The Committee on Climate Change (CCC) and the National Infrastructure Committee (NIC) are examples of existing bodies that play such roles in relation to high-level decarbonisation and infrastructure planning respectively. Although neither the CCC nor the NIC have the specific remit or capacity to advise in detail on energy policy, a body that did so would need to take the advice and recommendations of these two existing bodies into account in reaching its own conclusions.

Care would have to be exercised in the setting up and populating of such a body. On the one hand it would be essential that it is not dominated by the ‘usual suspects’ from incumbent industry actors, so there would be a need to step away from common assumptions about which actors have relevant knowledge and authority. On the other hand, such a body would need to have, or be able to draw on, independent sources of expertise given the complexity of the electricity industry. It would also have to have powers to access data and information from incumbent actors when required, possibly via the regulator, which already has some powers in this area.

Such a body would of course also be lobbied, so to establish credibility it would have to operate in a completely open and transparent way. Informal closed meetings could not be part of this. In gathering evidence, it would also have to actively seek out the experience and views of smaller, less well-organised actors that have fewer resources to represent their perspectives on policy, with an explicit recognition that the playing field is not level.

An open approach would also be desirable because such a body should be encouraging and facilitating a public debate about sustainable energy transition and policies to support it, as such a public debate is missing in most countries (and certainly in the UK). These two functions should reinforce each other, for as Culpepper (2011) notes, established corporate actors are able to exercise influence with less scrutiny precisely in those in policy areas and on decisions that receive less attention from the public and from ministers, i.e. in what might be called 'orphan' issues.

An independent body would not be able to develop the detailed design of policies once their key dimensions had been identified. However, for reasons that are clear from the analysis above, it should monitor the further development and report on any distortions that arise through lobbying at these stages.

The case of DSR in the GB CM illustrates the challenges arising in the policy process in the midst of energy transitions. Normal policy making processes are not sufficient to meet the task. There is thus not only a need for new policies, but also new ways of making policy.

Appendix 1 – Interviews

This article is based on research conducted on a wider study of the GB Capacity Market (CM) as a policy process. A number of interviews were conducted between July 2016 and January 2018 for that research (see Table A1.1). Interviewees were identified initially based on the extensive knowledge of and networks in the GB energy policy world, and in later stages by snowballing. Not all those contacted were willing to give interviews. Several requested anonymity, which we have preserved across all interviewees. The interviews were semi-structured, using bespoke interview schedules (available on request) that differed between interviewees depending on their knowledge or role in the process. As context, interviewees were told that the research was aimed at a better understanding of the process by which decisions were made in the CM, and the roles of energy companies in that process.

Table A1.1: Interviews

No.	Date	Position at time of CM process	Role in process
1	19 July 2016	Director of NGO	Observer
2	12 July 2016	Political advisor in government 2010-2012	Government participant
3	19 July 2016	Regulation director in a Big Six company	Observer from within incumbent
4	21 July 2016	Manager in a Big Six company	Participant from within incumbent
5	27 July 2016	Senior official in DECC	Government participant
6	23 February 2017	Policy manager in a Big Six company	Participant from within incumbent
7	17 May 2017	Consultant	Consultant and observer
8	9 June 2017	Consultant	Observer
9	28 June 2017	Staff member in UK Business Council for	Participant

		Sustainable Energy	
11	20 July 2017	Commercial energy lawyer	Observer
12	19 October 2017	Head of regulation in a Big Six company	Participant from within incumbent
13	10 January 2018	Director of DSR aggregator	Participant from within DSR firm

Notes

¹ <https://www.nationalgrideso.com/balancing-services/demand-side-response-dsr>

² See also <https://www.theade.co.uk/resources/what-is-demand-side-response>

³ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62014TN0793&from=EN>.

⁴ For example, Chris Huhne, then Secretary of State for Energy and Climate Change, in ECCC 2011: 116.

⁵ This view also applies to capacity mechanisms in other countries; see for example Van der Burg and Whitley 2016: 35.

⁶ The generation arms of these companies are: Centrica, EDF Energy, E.On, RWE, Scottish and Southern Energy and Scottish Power

⁷ These responses can be found at: <https://www.gov.uk/government/consultations/electricity-market-reform> and <https://www.gov.uk/government/consultations/possible-models-for-a-capacity-mechanism> respectively. The Big Six and other large generating companies made submissions that are in the public domain; additional confidential submissions may have been made, but evidence from interviews suggest that the ideas considered important by policy makers were present in publicly available submissions.

⁸ Interviews 1 and 4. The consortia consisted of: E.ON and RWE seeking to build two plants at Wylfa on Anglesey and Oldbury near Bristol; EDF and Centrica also seeking to build two plants at Hinkley Point in Somerset and Sizewell in Suffolk, and SSE and Iberdrola (owner of Scottish Power) together with GDF Suez seeking to build one plant in Cumbria.

⁹ <https://www.ofgem.gov.uk/electricity/wholesale-market/market-efficiency-review-and-reform/electricity-market-reform-emr>

¹⁰ Interviews 1, 4, 5, 7, 9

¹¹ Interviews 1, 6 and 7

¹² Interview 1

¹³ A minority of companies were opposed to an intervention. This may be explained by whether companies had recent or current investments in new CCGT plants at the time, and also by differences in corporate culture.

¹⁴ Interviews 2 and 5.

¹⁵ See e.g. written submission to ECCC (2012: Ev 139-140)

¹⁶ See e.g. written submission to ECCC (2012: Ev 174-175)

¹⁷ Interview 2. ECF is the European Climate Foundation

¹⁸ Interview 1. Gottstein and a colleague produced a paper (Gottstein and Schwartz 2010) on the role of capacity markets in developing DSR in May of 2010, which was then subsequently cited in the December 2010 EMR Consultation document.

¹⁹ DONG in particular explicitly argued that generation-only solutions to intermittency were not desirable: 'Any mechanism that is introduced must be flexible enough to accommodate smart grids, smart meters and demand side measures that will develop...' (DONG 2010: 3); 'Including cost-effective participation of DSR is fundamental to solving resource adequacy and security of supply constraints and any market intervention should be designed to allow participation and growth of this service.' (DONG 2011: 6).

²⁰ Interview 4

²¹ Interview 1

²² Interview 7

²³ Interview 5

²⁴ The independent Panel of Technical Experts set up in 2013 to review the methodology for how the amount of capacity to auction was to be set also expressed concern that the government did not appreciate the role of DSR.

²⁵ Speech to the Economist energy summit, 23 June 2011, <https://www.centrica.com/news/centrica-calls-honest-debate-uk-energy-security>

²⁶ Scottish Power Press Release, 15 January 2013, http://www.scottishpower.com/news/pages/scottishpower_comments_on_the_energy_bill_at_the_public_bill_committee.aspx

²⁷ <http://sse.com/newsandviews/allarticles/2013/03/review-of-thermal-generation-operations/>

²⁸ <https://www.gov.uk/government/groups/capacity-market-emr-expert-group>

²⁹ Centrica, RWE, Scottish Power, SSE, Drax, ESB International and Conoco Phillips

³⁰ <https://www.gov.uk/government/groups/electricity-market-reform-emr-collaborative-development>

³¹ <https://www.gov.uk/government/publications/engaging-with-decc-on-electricity-market-reform/engaging-with-decc-on-electricity-market-reform>

³² https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/232189/8_Aug_2013_Steering_Group_Meeting_Note_.pdf

³³ Interview 11. Appearance at meetings varied, and information is only available for two CM working group meetings in September 2013, but these included 8 representatives from the Big Six and second tier generators and one DSR firm (Flexitricity) on one occasion, and 7 incumbent generators and 5 DSR firms (EnerNoc, Open Energi, Kiwi Power, Flexitricity) and the UK Demand Response Association on the other (at which DSR rules were discussed). See 'Notes of the workshops so far' at <https://www.gov.uk/government/groups/electricity-market-reform-emr-collaborative-development>

³⁴ Interview 13

³⁵ Interview 13

³⁶ A point retrospectively acknowledged by one of the officials involved (Interview 5)

³⁷ <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/energy-and-climate-change-committee/implementation-of-electricity-market-reform/oral/16339.html>

³⁸ Interview 11

³⁹ Interview 11

⁴⁰ Interview 13

⁴¹ Interview 11

⁴² Interview 8

⁴³ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62014TN0793&from=EN>.

⁴⁴

<http://curia.europa.eu/juris/document/document.jsf?text=&docid=207792&pageIndex=0&doclang=en&mode=req&dir=&occ=first&part=1&cid=1430154>

⁴⁵ https://ec.europa.eu/commission/presscorner/detail/en/IP_19_6152

⁴⁶ For other studies that frame energy transitions in terms of competing coalitions see, for example, Hess 2014, Kungl 2015, Farla et al 2012 and Ullamen et al 2009.

⁴⁷ Interview 13

⁴⁸ Interview 11

⁴⁹ Interview 13

⁵⁰ As Helm (2014: 6) notes, 'it is curious that capture does not feature in the appraisal manuals for new policies, in the scrutiny of legislation and in the design of interventions.' It is worth noting that the government did make an explicit assessment of potential conflicts of interest for National Grid in taking on the role of delivery agent for the EMR, including the CM.

⁵¹ This approach was followed within the CM in a limited way in the creation of a Panel of Technical Experts to provide feedback on the methodology used for converting the reliability standard into capacity auction targets shows this, as it provided greater transparency about the process. However, the government also in the end did not take much notice of the PTE's views on plant availability assumptions. A stronger mandate is needed.

References

Aldridge, J., 2014. How industry lobbying on the UK capacity means old coal plants will stay on the system. Energydesk Blog, 24 July 2014, Greenpeace UK.

<http://www.greenpeace.org.uk/newsdesk/energy/analysis/comment-how-industry-lobbying-uk-capacity-market-means-old-coal-plants-will-stay-system> (accessed 17 January 2017).

Baker, P., Hogan, M., 2014. *A critique of the UK's Capacity Market proposals*, Policy Brief, Regulatory Assistance Project. www.raponline.org/document/download/id/7292 (accessed 20 March 2017).

Bawden, T., 2015. 'Big Six firms use influence to dictate energy policy, claims leading environmentalist' *The Independent*, 22 April 2015, Available at: <http://www.independent.co.uk/environment/big-six-firms-use-influence-to-dictate-energy-policy-claims-leading-environmentalist-10196672.html> (accessed 13 April 2017).

Beach, D., Pedersen, R. B., 2013. *Process-Tracing Methods: Foundations and Guidelines*, University of Michigan Press, Ann Arbor.

Bell, S., 2012. The power of ideas: The ideational shaping of the structural power of business. *International Studies Quarterly*, 56 (4), 661-673.

Bennett, A., Checkel, J., (Eds.), 2013. *Process tracing: From metaphor to analytical tool*, Cambridge University Press, Cambridge.

Department for Business, Energy and Industrial Strategy (BEIS), 2020. Capacity Market consultation on future improvements. BEIS: London, Available at: <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment>

<data/file/862674/capacity-market-consultation-future-improvements.pdf>. (Accessed 7 February 2020)

Bloomberg New Energy Finance (BNEF), 2012. *UK Big 6 Utility Investment Trends: A report for Greenpeace UK on the generation investments of the Big 6 utilities*

Cornwall Energy, 2015. Gremlins – does the capacity market trade short-term gain for long-term pain. *Energy Spectrum*, 456, 12 January 2015.

Cramton, P., Ockenfels, A., Stoft, S., 2013. Capacity market fundamentals. *Economics of Energy and Environmental Policy* 2(2), 27-46.

Culpepper, P. D., 2011. *Quiet Politics and Business Power: Corporate Control in Europe and Japan*, Cambridge University Press, Cambridge and New York.

Denholm, P., Hand, M., 2011. Grid flexibility and storage required to achieve very high penetration of variable renewable electricity. *Energy Policy* 39 (3), 1817-1830.

Department of Energy and Climate Change (DECC), 2010. *Electricity Market Reform: Consultation Document*, DECC: London.

Department of Energy and Climate Change (DECC), 2011a. *Planning our electric future: a White Paper for secure, affordable and low-carbon electricity* CM 8099, DECC: London.

Department of Energy and Climate Change (DECC), 2011b. *Planning our electric future: technical update* DECC: London.

Department of Energy and Climate Change (DECC), 2012a. *Digest of UK Energy Statistics* DECC: London.

Department of Energy and Climate Change (DECC), 2012b. *Electricity Market Reform Policy Overview* DECC: London.

Department of Energy and Climate Change (DECC), 2013. *Electricity Market Reform: Consultation on proposals for implementation* DECC: London.

Department of Energy and Climate Change (DECC), 2014a. *Electricity Market Reform: Consultation on proposals for implementation – Government response* DECC: London.

Department of Energy and Climate Change (DECC), 2014b. Capacity Market supplier charge methodology. Paper tabled at the Capacity Market Expert Group meeting, 24 January 2014, available at: <https://www.gov.uk/government/groups/capacity-market-emr-expert-group> (accessed 3 March 2018).

Department of Energy and Climate Change (DECC), 2015. The first ever Capacity Market auction official results have been released today. Press Release, 2 January 2015, <https://www.gov.uk/government/news/the-first-ever-capacity-market-auction-official-results-have-been-released-today> (accessed 11 October 2016).

DONG, 2010. Response to consultation on proposals for Electricity Market Reform, Available at: <https://www.gov.uk/government/consultations/electricity-market-reform> (accessed 10 May 2017).

DONG, 2011. Response to the consultation on proposals for a capacity mechanism (Annex C of the EMR White Paper), <https://www.gov.uk/government/consultations/possible-models-for-a-capacity-mechanism> (accessed 10 May 2017).

Drax, 2010. Response to consultation on proposals for Electricity Market Reform, Available at: <https://www.gov.uk/government/consultations/electricity-market-reform> (accessed 14 May 2017).

Drax, 2011. Response to the consultation on proposals for a capacity mechanism (Annex C of the EMR White Paper), <https://www.gov.uk/government/consultations/possible-models-for-a-capacity-mechanism> (accessed 15 May 2017).

Durwall, R., 2015. *Central planning with market features: How renewable subsidies destroyed the UK electricity market*. Centre for Policy Studies, <https://www.cps.org.uk/files/reports/original/150313101309-HowrenewablesubsidiesdestroyedtheUKelectricitymarket1.pdf> (accessed 14 April 2017).

E.ON, 2010. Response to the consultation on proposals for Electricity Market Reform. Available at: <https://www.gov.uk/government/consultations/electricity-market-reform> (accessed 14 May 2017).

E.ON, 2011. Response to the consultation on proposals for a capacity mechanism (Annex C of the EMR White Paper). <https://www.gov.uk/government/consultations/possible-models-for-a-capacity-mechanism> (accessed 22 May 2017).

EDF, 2011. Response to the consultation on proposals for a capacity mechanism (Annex C of the EMR White Paper). <https://www.gov.uk/government/consultations/possible-models-for-a-capacity-mechanism> (accessed 13 May 2017).

Energy and Climate Change Committee (ECCC), 2011. *Electricity Market Reform Volume I*, HC 742, The Stationery Office Ltd: London.

Energy and Climate Change Committee (ECCC), 2012. Draft Energy Bill: Pre-legislative Scrutiny, Volume I, HC 275-I, The Stationery Office Ltd: London, <https://publications.parliament.uk/pa/cm201213/cmselect/cmenergy/275/275.pdf> (accessed 20 January 2018).

Energy and Climate Intelligence Unit (ECIU), 2016. *Will Britain keep the lights on?*

<http://eciu.net/briefings/uk-energy-policies-and-prices/can-britain-keep-the-lights-on>

(accessed 20 April 2017).

EnerNOC, 2011. Response to the consultation on proposals for a capacity mechanism

(Annex C of the EMR White Paper).

<https://www.gov.uk/government/consultations/possible-models-for-a-capacity-mechanism>

(accessed 24 May 2017).

ESB International, 2011. Response to the consultation on proposals for a capacity

mechanism (Annex C of the EMR White Paper).

<https://www.gov.uk/government/consultations/possible-models-for-a-capacity-mechanism>

(accessed 11 May 2017).

Farla, J., Markard, J., Raven, R., Coenen, L., 2012. Sustainability transitions in the making: A closer look at actors, strategies and resources. *Technological forecasting and social change*, 79(6), 991-998.

Geels, F. W., 2014. Regime Resistance against Low-Carbon Transitions: Introducing Politics and Power into the Multi-Level Perspective. *Theory, Culture & Society*, 31, 21–40.

Gosden, E., 2013. Centrica backs power rationing as cheapest solution to energy crunch. *The Telegraph*, 31 July 2013,

<http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/10214972/Centrica-backs-power-rationing-as-cheapest-solution-to-energy-crunch.html> (accessed 13 July 2017).

Gottstein, M., Schwartz, L., 2010. *The Role of Forward Capacity Markets in Increasing Demand-Side and Other Low-Carbon Resources: Experience and Prospects*, Regulatory Assistance Project, available at: <http://www.raponline.org/wp->

[content/uploads/2016/05/rap-gottstein-schwartz-roleoffcm-experienceandprospects2-2010-05-04.pdf](#) (accessed 7 July 2017).

Gottstein. M., Skillings, S., 2012. Beyond capacity markets – Delivering capability resources to Europe’s decarbonised power system’ Regulatory Assistance Project, available at: <http://www.raponline.org/wp-content/uploads/2016/05/rap-gottsteinskillings-beyondcapacitymarketsieeeeaccepted-2012-april-24.pdf> (accessed 16 June 2017).

The Guardian, 2015. MPs slam “capacity market” scheme for raising energy costs. *The Guardian* 4 March 2015, <https://www.theguardian.com/environment/2015/mar/04/mps-slam-capacity-market-scheme-for-raising-energy-costs> (accessed 3 May 2017).

Helm, D., 2014. *The return of the CEGB? Britain’s central buyer model* Energy Futures Networks Paper No. 4, <http://www.dieterhelm.co.uk/assets/secure/documents/The-return-of-the-CEGB.pdf> (accessed 25 June 2018).

Hess, D. J., 2014. Sustainability transitions: A political coalition perspective. *Research Policy* 43, 278-283.

Hurley, D., Peterson, P., Whited, M., 2013. *Demand Response as a Power System Resource Program Designs, Performance and Lessons Learned in the United States*. Regulatory Assistance Project. Available at: <https://www.raponline.org/wp-content/uploads/2016/05/synapse-hurley-demandresponseasapowersystemresource-2013-may-31.pdf> (accessed 19 July 2018).

Institute for Public Policy Research (IPPR), 2016. *Incapacitated: Why the capacity market for electricity generation is not working and how to reform it*, IPPR: London.

InterGen, 2010. Response to the December 2010 on proposals for Electricity Market Reform, Available at: <https://www.gov.uk/government/consultations/electricity-market-reform> (accessed 10 May 2017).

International Power, 2010. Response to the December 2010 on proposals for Electricity Market Reform, Available at: <https://www.gov.uk/government/consultations/electricity-market-reform> (accessed 11 May 2017).

International Power, 2011. Response to the consultation on proposals for a capacity mechanism (Annex C of the EMR White Paper),
<https://www.gov.uk/government/consultations/possible-models-for-a-capacity-mechanism>
(accessed 11 May 2017)

Joskow, P. L., 2008. Capacity payments in imperfect electricity markets: need and design. *Utilities Policy* 16(3), 159-170.

Kern, F., Rogge, K., 2018. Harnessing theories of the policy process for analysing the politics of sustainability transitions: A critical survey. *Environmental Innovation and Societal Transitions* 27, 102-117.

Kiwi Power, 2010. Response to the December 2010 on proposals for Electricity Market Reform. Available at: <https://www.gov.uk/government/consultations/electricity-market-reform> (accessed 23 May 2017).

Kiwi Power, 2011. Response to the consultation on proposals for a capacity mechanism (Annex C of the EMR White Paper).
<https://www.gov.uk/government/consultations/possible-models-for-a-capacity-mechanism>
(accessed 23 May 2017).

Kungl, G., 2015. Stewards or sticklers for change? Incumbent energy providers and the politics of the German energy transition. *Energy Research & Social Science* 8, 13-23.

Kuzemko, C., Lockwood, M., Mitchell, C. and Hoggett, R., 2016. Governing for sustainable energy system change: politics, context and contingency. *Energy Research and Social Science* 12, pp 96–105.

Lehmann. P., et al., 2015. Capacity payments to secure electricity supply? On the future of Germany's power market design. *Energy, Sustainability and Society*, 5, 15. Available at: <https://energysustainsoc.biomedcentral.com/articles/10.1186/s13705-015-0039-7> (accessed 10 February 2020)

Littlecott, C., 2014. *Keeping coal alive and kicking: Hidden subsidies and preferential treatment in the UK Capacity Market* Briefing Paper, July 2014, E3G: London.
[https://www.e3g.org/docs/E3G_Briefing - Keeping coal alive and kicking - hidden subsidies and preferential treatment in the UK capacity market.pdf](https://www.e3g.org/docs/E3G_Briefing_-_Keeping_coal_alive_and_kicking_-_hidden_subsidies_and_preferential_treatment_in_the_UK_capacity_market.pdf) (accessed 6 June 2017).

Lund, P. D., Lindgren, J. Mikkola, J., Salpakari, J., 2015. Review of energy system flexibility measures to enable high levels of variable renewable electricity. *Renewable and Sustainable Energy Reviews*, 45, 785-807.

Meadowcroft, J., 2005. Environmental political economy, technological transitions and the state. *New Political Economy* 10(4), 479-98.

Mitchell, C., 2008. *The Political Economy of Sustainable Energy*, Palgrave Macmillan, Basingstoke.

NERA Economic Consulting, 2014. *The potential impact of demand-side response on customer bills*. Available at:

http://www.nera.com/content/dam/nera/publications/2014/PUB_Anstey_DSR_0814.pdf

Newbery, D. and Grubb, M., 2015. Security of supply, the role of interconnectors and options values: Insights from the GB capacity auction. *Economics of Energy and Environmental Policy* 4(2), 65-81.

PJM, 2013. *Emergency Demand Response (Load Management) Performance Report 2012/2013*, <http://www.pjm.com/-/media/markets-ops/dsr/emergency-dr-load-management-performance-report-2012-2013.ashx?la=en>

PJM, 2014. *Emergency Demand Response (Load Management) Performance Report 2013/2014*, <http://www.pjm.com/-/media/markets-ops/dsr/2013-2014-dsr-activity-report-20140417.ashx?la=en>

Pöyry/Imperial College, 2017. *Roadmap for flexibility services to 2030 – A report to the Committee on Climate Change*. Available at: <https://www.theccc.org.uk/wp-content/uploads/2017/06/Roadmap-for-flexibility-services-to-2030-Poyry-and-Imperial-College-London.pdf>

Scrase, I., Smith, A., 2009. The (non-)politics of managing low carbon socio-technical transitions. *Environmental Politics* 18, 5, 707-726.

Scottish Power, 2010. Response to the December 2010 on proposals for Electricity Market Reform. Available at: <https://www.gov.uk/government/consultations/electricity-market-reform>.

Scottish Power, 2011. Response to the consultation on proposals for a capacity mechanism (Annex C of the EMR White Paper).

<https://www.gov.uk/government/consultations/possible-models-for-a-capacity-mechanism>

Smink, M., Hekkert, M.P., Negro, S.O., 2015b. Keeping sustainable innovation on a leash? Exploring incumbents' institutional strategies. *Business Strategy and the Environment*, 24(2), 86-101.

SSE, 2010. Response to the December 2010 on proposals for Electricity Market Reform.

Available at: <https://www.gov.uk/government/consultations/electricity-market-reform>.

Stenzel, T. and Frenzel, A., 2008. Regulating technological change—The strategic reactions of utility companies towards subsidy policies in the German, Spanish and UK electricity market. *Energy Policy* 36, 7, 2645-2657

Tsagas, I., 2014. UK auctions capacity, sparks controversy. *PV Magazine*, 23 December 2014,

http://www.pv-magazine.com/news/details/beitrag/uk-auctions-capacity--sparks-controversy_100017606/#axzz4ClqzOzl

Unruh, G. C., 2000. Understanding carbon lock-in. *Energy Policy*, 28(12), 817-830.

Ulmanen, J.H., Verbong, G.P.J., Raven, R.P.J.M., 2009. Biofuel developments in Sweden and the Netherlands: protection and socio-technical change in a long-term perspective. *Renew. Sustain. Energy Rev.* 13, 1406–1417.

Van der Burg, L., Whitley, S., 2016. *Rethinking power markets: capacity mechanisms and decarbonisation* Overseas Development Institute. London.

<https://www.odi.org/sites/odi.org.uk/files/resource-documents/10569.pdf>

Whitehead, A., 2015. On Pyrrhus and his campaigns. Blog post, 16 January 2015.

<https://alansenergyblog.wordpress.com/2015/01/16/on-pyrrhus-and-his-campaigns-2/>

Wilks, S., 2013. *The Political Power of the Business Corporation*, Edward Elgar, Cheltenham.

Wilson, R. and Biewald, B., 2013. *Best practices in electric utility integrated resource planning*. Regulatory Assistance Project, Available on-line at: <https://www.raonline.org/wp-content/uploads/2016/05/rapsynapse-wilsonbiewald-bestpracticesinirp-2013-jun-21.pdf>

Yackee, J. W., Yackee, S. W., 2006. A bias towards business? Assessing interest group influence on the US bureaucracy. *The Journal of Politics* 68(1), 128-139.